ARITHMETIC.

Conducted by B. F. FINKEL, Kidder, Missouri. All Contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

22. Proposed by E. S. LOOMIS, A. M., Ph. D., Professor of Mathematics, Baldwin University, Berea, Ohio.

A borrows \$1,000 from B for 10 years, on which he pays 4% semi-annually.

A immediately loans the \$1,000 to C for 10 years, who agrees to pay to A \$12½ on the first of each month for 120 mos. or 10 yrs., at which time the whole debt is considered canceled, C no longer being, in any way, indebted to A. Upon the receipt of each of the \$12½ payments made by C, A immediately reloans it to D, E, F, etc., upon the same conditions as he loaned the \$1,000 to C; at the end of 120 mos. all who are indebted to A pay up in full all due him, and he (A) pays B the principal, all interest having been paid when due.

Query: How many dollars has he in hand?

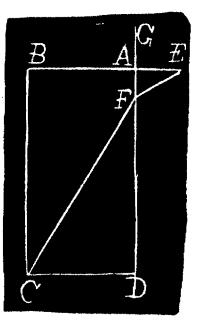
NO SOLUTION RECEIVED.

23. Proposed by H. C. WHITAKER, Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

A rectangular hall 80 feet long, 40 feet wide and 12 feet high, has a spider in one corner of the ceiling. How long will it take the spider to crawl to the opposite corner on the floor, if he crawls a foot in a second on the wall and two feet in a second on the floor?

I. Solution by Professor J. A. TIMMONS, St. Mary's, Kentucky, and the PROPOSER

It seems to me this problem does not belong to arithmetic. Were the *shortest route* required, arithmetic would solve it; a line from E (the *side* wall supposed to be lying down) to C being the required distance=95.41 ft. The time to travel *this* route=$22.02+\frac{73.4}{2}=58.72$ seconds.



Were the spider to descend the *end* wall, a line from G to C would give the shortest distance by that route; but although this distance is *longer* than the other one, being 100.32 ft., the *time* would be shorter, being only $13.085+\frac{87.233}{2}=56.691$ seconds. Hence we see that arithmetic alone will not solve it.

Let F be point when spider reaches the floor; call AF x; then $FD=80-x$.

We have $EF=\sqrt{x^2+144}$, and $CF=\sqrt{8000-160x+x^2}$; hence the *time* required in seconds=$\sqrt{x^2+144}+\sqrt{2000-40x+\frac{x^2}{4}}$; that is, $u=\sqrt{x^2+144}$